We claim:

1. Method for the membrane electrophoresis of substances which are dissolved or dispersed in electrolyte-containing solution using an at least quadrupartite separation chamber (7) which comprises at least one diluate space (16) and one concentrate space (17), a cathode space (18) and an anode space (21) having electrodes as anode (19) and cathode (20), the spaces being separated from each other by porous membranes, especially ultrafiltration and/or microfiltration membranes (14, 15); an electrode rinsing solution being circulated through the electrode spaces (18, 21), and the diluate being continuously conducted through the diluate space (16), and, respectively, the concentrate being continuously conducted through the concentrate space (17), wherein at least one substance which is dissolved or dispersed in the diluate is transferred electrophoretically, by means of an electrical field which is applied between the anode (19) and the cathode (20), from the diluate space (16) to the concentrate space (17), with a pressure difference of at least 3 kPa being maintained between the diluate space (16) and the concentrate space (17).

2. Method according to Claim 1, wherein the pressure difference maintained between the diluate space (16) and the concentrate space (17) is a pressure difference sufficient to essentially prevent any liquid flow through the separation membrane (15) which separates the concentrate space (17) and the diluate space (16) from each other.

3. Method according to Claim 1, wherein the separation chamber (7) comprises a separation module (7a) which is comprised of several diluate spaces (16a, 16b, ...) and concentrate spaces (17a, 17b, ...), with the diluate spaces (16a, 16b, ...) and concentrate spaces (17a, 17b, ...) being arranged alternately between the anode space (21) and cathode space (18), which are separated from each other by means of ultrafiltration and/or microfiltration membranes (14, 15) and operated in parallel and/or in series.

4. Method according to Claim 1, wherein the diluate liquid, the concentrate liquid and the electrode rinsing solution, or any one of these solutions, is/are temperature-controlled.

5. Method according to Claim 4, wherein at least two of said diluate liquid, concentrate liquid and electrode rinsing solution are temperature-controlled, and each is temperature-controlled independently of the other(s).

6. Method according to Claim 4, wherein said temperature-control comprises cooling.

7. Method according to Claim 1, wherein the membranes have a pore size of from 1 to 1,000 nm.

8. Method according to Claim 7, wherein the membranes areformed of a material selected from the group consisting of cellulose ester, polyacrylonitrile, polyamide, polyether, polyethersulphone, polypropylene, polysulphone, polyvinyl alcohol, polyvinylidene fluoride, aluminium oxide, silicon oxide, titanium oxide, zirconium oxide, and ceramics comprised of one or more of the abovementioned oxides.

9. Method according to Claim 1, wherein electrode rinsing solution is passed through the anode space (21) and the cathode space (18) independently of each other.

10. Method according to Claim 1, wherein the diluate solution, the concentrate solution and the electrode rinsing solution comprise electrolytes which are combinations of weak acids and weak bases, weak acids and strong bases or strong acids and weak bases.

11. Method according to Claim 10, wherein the electrolytes comprise one or more compounds selected from the group consisting of boric acid, phosphoric acid, N-2-(acetamido)-2-aminoethanesulphonic acid, N-2-(acetamido)iminodiacetic acid, alanine, 2-amino-2-methyl-1,3-propanediol, ammonia, N,N-bis(2-hydroxyethyl)-2-aminoethanesulphonic acid, N,N-bis(2-hydroxyethyl)glycine, 2,2-bis(hydroxyethyl)iminotris(hydroxymethyl)methane, 2-cyclohexylamino(ethanesulphonic acid), acetic acid, glycine, glycylglycine, 2-[4-(2-hydroxyethyl)-1-piperazinyl]ethanesulphonic acid, 3-[4-(2-hydroxyethyl)-1-piperazinyl]propanesulphonic acid, histidine, imidazole, lactic acid, 2-morpholinoethanesulphonic acid, 2-morpholinopropanesulphonic acid, piperazine-1,4-bis(2-ethanesulphonic acid), N-[tris(hydroxymethyl)methyl]-2-aminoethanesulphonic acid, N-[tris(hydroxymethyl)methyl]glycine, triethanolamine, tris(hydroxymethyl)aminomethane and citric acid.

12. Method according to Claim 1, wherein the current density, based on the area of the individual membranes, is from 10 to 1,000 A/m^2.

13. Method according to Claim 12, wherein said current density is from 10 to 500 A/m^2

14. Method according to Claim 1, wherein the conductivity of the diluate solution is from 0.1 mS/cm to 40 mS/cm.

15. Method according to Claim 14, wherein said conductivity is from 0.1 to 10 mS/cm.

16. Method according to Claim 1, wherein the conductivity of the diluate solution is lowered during the separation.

17. Method according to Claim 1, wherein, after the separation, the diluate solution is concentrated by microfiltration, ultrafiltration, nanofiltration or reverse osmosis, and returned to the diluate space (16).

18. Method according to Claim 1, wherein said substance is selected from the group consisting of proteins, peptides, DNA, RNA, oligonucleotides, oligosaccharides, polysaccharides, viruses, virus constituents, cells, cell constituents, enantiomers, diastereomers and combinations thereof.

19. Appliance for membrane electrophoresis, comprising an at least quadrupartite separation chamber (7) having at least one diluate space (16) and at least one concentrate space (17) and also a cathode space (18) and an anode space (21) having electrodes as anode (19) and cathode (20), with the individual spaces (16, 17, 18, 21) being separated from each other by porous membranes, especially ultrafiltration or microfiltration membranes (14, 15); feed lines (22) and discharge lines (23) for the diluate, feed lines (24) and discharge lines (25) for the concentrate, optionally feed lines (26) and discharge lines (27) for the electrode washing solution, and also a pressure regulation system (8; 10) or (9; 11) by which a pressure difference of at least 3 kPa can be generated between the diluate space (16) and the concentrate space (17).

20. Appliance according to Claim 19, wherein the separation chamber (7) is subdivided into several diluate spaces (16a, 16b, ...) and concentrate spaces (17a, 17b, ...).

21. Appliance according to Claim 20, wherein the several diluate spaces (16a, 16b, ...) and concentrate spaces (17a, 17b, ...), are separated from each other by means of porous restriction membranes (14) or separation membranes (15) and are optionally connected to each other in parallel and/or in series, and are arranged alternately between the anode space (21) and the cathode space (18).

22. Appliance according to Claim 19, wherein feed lines (22) and discharge lines (23) for the diluate are arranged in a diluate circuit (1; 4; 22; 23), feed lines (24) and discharge lines (25) for the concentrate are arranged in a concentrate circuit (2; 5; 24; 25) and, optionally, feed lines (26) and discharge lines (27)

for the electrode rinsing solution are arranged in an electrode rinsing circuit (3; 6; 26; 27).

23. Appliance according to Claim 22 comprising heat exchangers in one or more of said circuits.

24. Appliance according to Claim 19, wherein said membranes have a pore size of from 1 to 1,000 nm.

25. Appliance according to Claim 19, wherein the membranes are formed of a material selected from the group consisting of
cellulose ester, polyacrylonitrile, polyamide, polyether, polyethersulphone, polypropylene, polysulphone, polyvinyl alcohol, polyvinylidene fluoride, aluminium oxide, silicon oxide, titanium oxide, zirconium oxide and ceramics comprised of the above mentioned oxides.

26. Appliance according to Claim 22, wherein the electrode rinsing circuit comprises a separate anode rinsing circuit and cathode rinsing circuit.